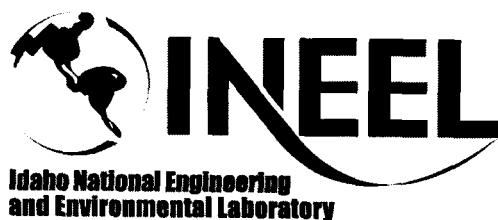


Engineering Design File

TRU Calculations for SFE-20 Waste Tank

Prepared for:
U.S. Department of Energy
Idaho Operations Office
Idaho Falls, Idaho



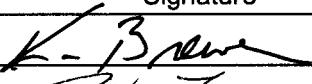
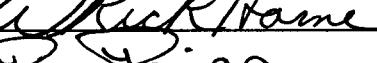
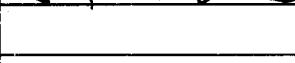
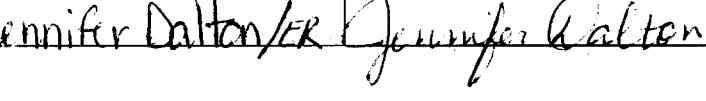
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Rev. No. , 0,

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1. Title:	TRU Calculations for SFE-20 Waste Tank			
2. Project File No.:				
3. Index Codes:				
Building/Type	CPP-602	SSC ID	N/A	
Site Area INTEC				
4. Summary:	This engineering design file documents the derived concentrations of Am-241 and Np-237 in the SFE-20 Waste Tank in relation to the analytically determined Pu concentration obtained from a 1984 sampling event. The derived Am-241 and Np-237 concentrations were summed with the Pu-238 and Pu-239 concentrations (the predominant TRU isotopes in INTEC waste streams) to determine if the solids exceed the 100 nCi/g Transuranic (TRU) waste disposal limit.			
5. Review (R) and Approval (A) and Acceptance (Ac) Signatures: (See instructions for definitions of terms and significance of signatures.)				
R/A	Typed Name/Organization		Signature	Date
Author	Ken Brewer			7/18/02
Checker	R	Pat Troescher		7/18/02
Independent Peer Reviewer	A	W. Rick Horne		8/21/02
Doc. Owner	A	Randy Rice		7/24/02
Requestor	Ac	Randy Rice		7/24/02
Doc. Control	A	Jennifer Dalton/ER		9/3/02
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Item and activity to which the QA Record apply:				
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TRU Calculations for SFE-20 Waste Tank

1. INTRODUCTION

SFE-20 Waste Tank is located in the Idaho Nuclear and Engineering Center's (INTEC) south basin area of CPP-603. The tank system was built in 1957 to collect low-level liquid wastes resulting from the receipt, storage and cutting of aluminum clad fuel from the Savannah River Test Reactor Program. The fuel cutting activities began in 1959 and lasted until 1962. Acid was added to tank SFE-20 at the end of the fuel cutting operations and the contents of the tank were heated in an attempt to dissolve any aluminum fuel fines resulting from the cutting process. The tank was practically isolated in 1976 and the remaining contents of the tank were sampled in 1984 for the purpose of characterization.¹

Unfortunately, plutonium isotopes were the only TRU elements requested in the sample analysis of samples from SFE-20. Regulatory rules have changed since the 1984 sample request and the concentration of the other TRU elements is important so that a waste determination can be made on the tank solids. The predominant TRU isotopes at INTEC are Np-237, Pu-238, Pu-239 and Am-241. The Pu-238 and Pu-239 concentrations in SFE-20 solids were analytically determined from the samples taken in 1984.

2. METHODOLOGY

Am-241 and Np-237 activities in solids from SFE-20 were estimated by taking the ratio of Am-241 and Np-237 with respect to the total plutonium activity from the attached aluminum calcine source term calculated by Doug Wenzel (Attachment 1). These two ratios were used to determine the Am-241 and Np-237 activities in the SFE-20 solids using the analytically determined plutonium activity. Aluminum calcine was generated from aluminum fuel reprocessing raffinates. Therefore, the Am-241 to Pu_{total} and Np-237 to Pu_{total} ratios in the aluminum calcine source term should closely approximate those of the SFE-20 solids since this tank was associated with aluminum fuel cutting activities.

Wenzel reports the aluminum calcine source term for the year 2016. It is not known if Wenzel used 2016 as t₀ or a previous year. Pu-238 decay was ignored because of the uncertainty in Wenzel's t₀. Ignoring the Pu-238 decay may introduce a slight error in determining the Np-237/Pu_{total} and Am-241/Pu_{total} ratios. Pu-238 decay was also ignored when determining the overall TRU activity in the SFE-20 samples.

3. DATA

Total plutonium, activities and Pu-238 and Pu-239 percentages from samples taken in 1984 are shown in Table 1. Sample 12, sediment from the bottom 6 inches of the tank, contains the largest plutonium activity (approximately 93.5 nCi plutonium per gram of tank solids). These data are recorded in Analytical Laboratory Log Number 84-021529 (Attachment 2) and WINCO-1021 (Attachment 3).

Table 1. Plutonium Activities in Samples Taken from the SFE-20 Tank System.

Sample ID	Location	Type	Total Plutonium Activity	Percent Pu-238 Activity	Percent Pu-239 Activity
9	Floor - center section	Liquid	1.02E+02 pCi/mL	76 %	24 %
10	SFE-20 tank interior	Liquid	1.76E+02 ^a pCi/mL	90 %	10 %
11	Floor - north end of vault	Dry solids	7.92E+04 pCi/gm	92 %	8.0 %
12	Bottom 6" of tank interior	Sediment	9.35E+04 pCi/gm	83 %	17 %
13	Bottom of pump pit	Wet solids	3.01E+03 pCi/gm	46 %	54 %

a. Table 2 of WINCO-1021 shows an incorrect activity for Sample 10. Data from Log 84-021529 is correct for this sample.

Np-237, Pu-238, Pu-239, and Am-241 activities taken from Wenzel's aluminum calcine source term are shown in Table 2. The magnitude of the Pu-238, Pu-239 or Pu_{total} activities may not agree with those activities shown in Table 1; however the ratio of Pu-238 and Pu-239 with respect to Pu_{total} should agree. As seen in Tables 1 and 2, the ratio of Pu-238 and Pu-239 activities with respect to the Pu_{total} tend to agree. There is a discrepancy in ratios for Sample 13 and the aluminum calcine source term. This discrepancy cannot be explained. Based on the general agreement of Pu-238 and Pu-239 ratios, Wenzel's aluminum calcine source term was determined to be satisfactory for calculating the Np-237/ Pu_{total} and Am-241/ Pu_{total} ratios. These ratios were then be used to estimate the Np-237 and Am-241 activities in the SFE-20 samples taken in 1984.

Table 2. Np-237, Pu-238, Pu-239, Pu_{total} , and Am-241 Activities and Am-241 to Pu_{total} and Np-237 to Pu_{total} ratios in Aluminum Calcine Source Term.

Isotope	Activity (Ci/gm)	Ratios Based on Activity
Np-237	5.00E-09	Np/ Pu_{total} = 2.34E-03
Pu-238	1.90E-06	Pu-238/ Pu_{total} = 8.88E-01
Pu-239	2.40E-07	Pu-239/ Pu_{total} = 1.12E-01
Pu_{total}	2.14E-06	NA
Am-241	5.40E-07	Am/ Pu_{total} = 2.52E-01

4. RESULTS

Equations 1 and 2 below were used to estimate the Np-237 and Am-241 activities in the SFE-20 samples. The estimated N-237 and Am-241 activities are shown in Table 3. Table 4 shows the estimated TRU activity in the SFE-20 samples based on sum of the Pu_{total} , Np-237 and Am-241 activities.

Eq. 1 Np-237/ Pu_{total} for the specific SFE-20 sample = 2.34E-03

Eq. 2 Am-241/ Pu_{total} for the specific SFE-20 sample = 2.52E-01

Table 3. Estimated Np-237 and Am-241 Activities in SFE-20 Samples.

Sample ID	Np-237 Activity	Am-241 Activity
9	2.39E-04 nCi/mL	2.57E-02 nCi/mL
10	4.12E-04 nCi/mL	4.44E-02 nCi/mL
11	1.85E-01 nCi/gm	1.20E+01 nCi/gm
12	2.19E-01 nCi/gm	2.36E+01 nCi/gm
13	7.04E-03 nCi/gm (wet solids)	7.59E-01 nCi/gm (wet solids)

Table 4. Estimated TRU Activity in the SFE-20 Samples.

Sample ID	TRU Activity ^a
9	1.28E-01 nCi/gm
10	2.21E-01 nCi/gm
11	9.14E+01 nCi/gm
12	1.17E+02 nCi/gm
13	3.78E+00 nCi/gm

a. Assumed a density of 1 g/mL for Samples 9 and 10 to convert from nCi/mL to nCi/gram.

5. CONCLUSIONS

Samples 9, 10, 11, and 13 from SFE-20 are estimated to be below the 100 nCi/gram TRU waste limit, while Sample 12 is estimated to be above the 100 nCi/gram TRU limit. This EDF is not conclusive in determining whether the entire contents of the tank can be categorized as TRU waste.

6. REFERENCES

1. Analytical Laboratory Log 84-021529.
2. WINCO-1021, "Radiological Characterization and Decision analysis for the SFE-20 Waste Tank and Vault", September 1984.

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Attachment 1
Aluminum Calcine Source Term

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Calculated Radionuclide Activities for Al Calcine in Ci/g as a Function of Decay Time
From Doug Wenzel (Wen-20-97)

Nuclide	Half-Life	Units	2016	Decay Time Since 2016 (yr)			
				2035	1.00E+02	5.00E+02	1.00E+03
(Actinides and Daughters)							
Tl207	4.77E+00	m	2.40E-11	2.70E-11	3.10E-11	3.20E-11	3.30E-11
Tl208	3.05E+00	m	2.50E-13	2.10E-13	7.90E-14	3.40E-15	1.80E-15
Tl209	2.20E+00	m	4.80E-16	5.10E-16	9.60E-16	7.10E-15	2.40E-14
Pb209	3.25E+00	h	2.20E-14	2.40E-14	4.40E-14	3.30E-13	1.10E-12
Pb210	2.23E+01	yr	4.30E-12	7.50E-12	2.70E-11	1.10E-10	2.10E-10
Pb211	3.61E+01	m	2.40E-11	2.70E-11	3.10E-11	3.20E-11	3.30E-11
Pb212	1.06E+01	h	6.90E-13	5.70E-13	2.20E-13	9.50E-15	5.00E-15
Pb214	2.68E+01	m	9.30E-12	1.30E-11	3.40E-11	1.10E-10	2.10E-10
Bi210MM	3.00E+06	yr	9.10E-29	9.10E-29	9.10E-29	9.10E-29	9.10E-29
Bi210	5.01E+00	d	4.30E-12	7.50E-12	2.70E-11	1.10E-10	2.10E-10
Bi211	2.13E+00	m	2.40E-11	2.70E-11	3.10E-11	3.20E-11	3.30E-11
Bi212	6.06E+01	m	6.90E-13	5.70E-13	2.20E-13	9.50E-15	5.00E-15
Bi213	4.57E+01	m	2.20E-14	2.40E-14	4.40E-14	3.30E-13	1.10E-12
Bi214	1.99E+01	m	9.30E-12	1.30E-11	3.40E-11	1.10E-10	2.10E-10
Po210	1.38E+02	d	4.30E-12	7.50E-12	2.70E-11	1.10E-10	2.10E-10
Po211	5.16E-01	s	6.60E-14	7.60E-14	8.80E-14	9.00E-14	9.30E-14
Po212	3.00E-07	s	4.40E-13	3.70E-13	1.40E-13	6.10E-15	3.20E-15
Po213	4.20E-06	s	2.20E-14	2.30E-14	4.30E-14	3.20E-13	1.10E-12
Po214	1.64E-04	s	9.30E-12	1.30E-11	3.40E-11	1.10E-10	2.10E-10
Po215	1.78E-03	s	2.40E-11	2.70E-11	3.10E-11	3.20E-11	3.30E-11
Po216	1.46E-01	s	6.90E-13	5.70E-13	2.20E-13	9.50E-15	5.00E-15
Po218	3.05E+00	m	9.30E-12	1.30E-11	3.40E-11	1.10E-10	2.10E-10
At217	3.23E-02	s	2.20E-14	2.40E-14	4.40E-14	3.30E-13	1.10E-12
Rn219	3.96E+00	s	2.40E-11	2.70E-11	3.10E-11	3.20E-11	3.30E-11
Rn220	5.56E+01	s	6.90E-13	5.70E-13	2.20E-13	9.50E-15	5.00E-15
Rn222	3.82E+00	d	9.30E-12	1.30E-11	3.40E-11	1.10E-10	2.10E-10
Fr221	4.80E+00	m	2.20E-14	2.40E-14	4.40E-14	3.30E-13	1.10E-12
Fr223	2.18E+01	m	3.30E-13	3.80E-13	4.30E-13	4.50E-13	4.60E-13
Ra223	1.14E+01	d	2.40E-11	2.70E-11	3.10E-11	3.20E-11	3.30E-11
Ra224	3.62E+00	d	6.90E-13	5.70E-13	2.20E-13	9.50E-15	5.00E-15
Ra225	1.48E+01	d	2.20E-14	2.40E-14	4.40E-14	3.30E-13	1.10E-12
Ra226	1.60E+03	yr	9.30E-12	1.30E-11	3.40E-11	1.10E-10	2.10E-10
Ra228	5.75E+00	yr	8.90E-17	9.00E-17	9.10E-17	9.60E-17	1.00E-16
Ac225	1.00E+01	d	2.20E-14	2.40E-14	4.40E-14	3.30E-13	1.10E-12
Ac227	2.18E+01	yr	2.40E-11	2.70E-11	3.10E-11	3.20E-11	3.30E-11
Ac228	6.13E+00	h	8.90E-17	9.00E-17	9.10E-17	9.60E-17	1.00E-16
Th227	1.87E+01	d	2.30E-11	2.70E-11	3.10E-11	3.20E-11	3.30E-11
Th228	1.91E+00	yr	6.90E-13	5.70E-13	2.20E-13	9.50E-15	5.00E-15
Th229	7.34E+03	yr	2.20E-14	2.40E-14	4.40E-14	3.30E-13	1.10E-12
Th230	7.70E+04	yr	4.90E-10	5.00E-10	5.10E-10	5.60E-10	6.30E-10
Th231	2.55E+01	h	1.00E-10	1.00E-10	1.00E-10	1.00E-10	1.00E-10
Th232	1.41E+10	yr	9.00E-17	9.00E-17	9.10E-17	9.60E-17	1.00E-16
Th234	2.41E+01	d	5.80E-12	5.80E-12	5.80E-12	5.80E-12	5.80E-12
Pa231	3.73E+04	yr	3.20E-11	3.20E-11	3.20E-11	3.20E-11	3.30E-11
Pa233	2.70E+01	d	5.00E-09	5.00E-09	5.00E-09	5.10E-09	5.10E-09

Pa234MM	1.17E+00	m	5.80E-12	5.80E-12	5.80E-12	5.80E-12	5.80E-12
Pa234	6.70E+00	h	7.60E-15	7.60E-15	7.60E-15	7.60E-15	7.60E-15
U232	7.20E+01	yr	6.70E-13	5.60E-13	2.20E-13	9.30E-15	4.90E-15
U233	1.59E+05	yr	7.00E-13	1.10E-12	3.30E-12	1.20E-11	2.30E-11
U234	2.45E+05	yr	1.50E-08	1.50E-08	1.50E-08	1.60E-08	1.60E-08
U235	7.04E+08	yr	1.00E-10	1.00E-10	1.00E-10	1.00E-10	1.00E-10
U236	2.34E+07	yr	2.40E-10	2.40E-10	2.40E-10	2.40E-10	2.40E-10
U237	6.75E+00	d	2.10E-11	8.30E-12	6.70E-14	1.20E-19	1.20E-19
U238	4.47E+09	yr	5.80E-12	5.80E-12	5.80E-12	5.80E-12	5.80E-12
U240	1.41E+01	h	2.20E-19	2.20E-19	2.20E-19	2.20E-19	2.20E-19
Np235	3.96E+02	d	2.00E-26				
Np237	2.14E+06	yr	5.00E-09	5.00E-09	5.00E-09	5.10E-09	5.10E-09
Np238	2.12E+00	d	9.10E-14	8.30E-14	5.30E-14	8.50E-15	8.70E-16
Np239	2.36E+00	d	1.90E-11	1.90E-11	1.90E-11	1.80E-11	1.70E-11
Np240m	7.40E+00	m	2.20E-19	2.20E-19	2.20E-19	2.20E-19	2.20E-19
Pu236	2.85E+00	yr	5.00E-15	4.90E-15	4.90E-15	4.90E-15	4.90E-15
Pu238	8.78E+01	yr	1.90E-06	1.60E-06	7.30E-07	3.10E-08	6.00E-10
Pu239	2.41E+04	yr	2.40E-07	2.40E-07	2.40E-07	2.40E-07	2.30E-07
Pu240	6.57E+03	yr	9.60E-08	9.60E-08	9.40E-08	9.10E-08	8.60E-08
Pu241	1.44E+01	yr	8.40E-07	3.40E-07	2.70E-09	4.90E-15	4.70E-15
Pu242	3.76E+05	yr	7.20E-12	7.20E-12	7.20E-12	7.20E-12	7.20E-12
Pu243	4.96E+00	h	4.30E-23	4.30E-23	4.30E-23	4.30E-23	4.30E-23
Pu244	8.26E+07	yr	2.20E-19	2.20E-19	2.20E-19	2.20E-19	2.20E-19
Am241	4.32E+02	yr	5.40E-07	5.40E-07	4.70E-07	2.50E-07	1.10E-07
Am242m	1.52E+02	yr	1.80E-11	1.70E-11	1.10E-11	1.70E-12	1.70E-13
Am242	1.80E+01	h	1.80E-11	1.70E-11	1.00E-11	1.70E-12	1.70E-13
Am243	7.38E+03	yr	1.90E-11	1.90E-11	1.90E-11	1.80E-11	1.70E-11
Cm242	1.63E+02	d	1.50E-11	1.40E-11	8.70E-12	1.40E-12	1.40E-13
Cm243	2.85E+01	yr	9.70E-13	6.10E-13	5.40E-14	3.20E-18	1.70E-23
Cm244	1.81E+01	yr	3.00E-11	1.40E-11	3.10E-13	7.10E-20	3.40E-28
Cm245	8.50E+03	yr	5.10E-15	5.10E-15	5.10E-15	4.90E-15	4.70E-15
Cm246	4.75E+03	yr	1.20E-16	1.20E-16	1.20E-16	1.10E-16	1.00E-16
Cm247	1.56E+07	yr	4.30E-23	4.30E-23	4.30E-23	4.30E-23	4.30E-23
Cm248	3.39E+05	yr	1.30E-23	1.30E-23	1.30E-23	1.30E-23	1.30E-23
Cf249	3.51E+02	yr	2.60E-23	2.50E-23	2.10E-23	9.40E-24	3.50E-24
Cf250	1.31E+01	yr	2.20E-24	8.10E-25	4.10E-27	2.50E-36	
Cf251	9.00E+02	yr	7.00E-26	6.90E-26	6.40E-26		
Cf252	2.64E+00	yr	5.50E-29				

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Attachment 2
Analytical Log 84-021529

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Log Search

Date of Search: 2002-06-18 17:06:24.194

Run by: RICK ANSELMO

Search Criteria:

Start Log.....:840101 1
End Log.....:841231 15
Log Approval.:ALL Logs
Result Type..:All Entries
Lab/Group....:ALL Groups
Name Column..:Lab Sample ID
Request Name...:*SFE*2*

Total # Logs Found...: 2

Total # Results Found: 41

Log #	Request Name	Log Type	Charge Num	Log Approval Info
I	L			
d Lab	Meth	a Ana-		
x ID	#	b lyst	Analyte	ARL
				Result
840215-29	SFE 20 AREA		89446-221-000	Unapproved by
119	#9	25920 PAG URANIUM	...	< 1.5958E-04 G/L
126	1	3993 ILD GAMMA SCAN	...	ATTACHED
127	2	3993 ILD GAMMA SCAN	...	ATTACHED
128	3	3993 LEE GAMMA SCAN	...	ATTACHED
129	4	3993 LEE GAMMA SCAN	...	ATTACHED
130	5	3993 ILD GAMMA SCAN	...	ATTACHED
131	7	3993 LEE GAMMA SCAN	...	ATTACHED
132	8	3993 ILD GAMMA SCAN	...	ATTACHED
133	9	3993 LEE GAMMA SCAN	...	ATTACHED
134	10	3993 LEE GAMMA SCAN	...	ATTACHED
135	14	3993 LEE GAMMA SCAN	...	ATTACHED
136	11	3993 ILD GAMMA SCAN	...	ATTACHED
137	12	3993 ILD GAMMA SCAN	...	ATTACHED
138	13	3993 ILD GAMMA SCAN	...	ATTACHED
139	9	5092 FLUORIDE	...	NOT REQUESTED
140	10	5092 FLUORIDE	...	NOT REQUESTED
141	12	5092 FLUORIDE	...	NOT REQUESTED
142	9	3991 TVP GROSS ALPH	...	0.027 A/S/ML
143	10	3991 TVP GROSS ALPH	...	0.036 A/S/ML
144	13	3994 TLV ALPHA SCAN	...	TOO HOT FOR INSTRUMENT
145	9	3941 TVP PLUTONIUM	...	<u>3.78D/S/ML 38=76% 39=24%</u>
146	10	3941 TVP PLUTONIUM	...	<u>6.53D/S/ML 38=90% 39=10%</u>
147	13	3941 TVP PLUTONIUM	...	<u>111.4D/S/G 46%=38 54%=39</u>
148	12	3941 TVP PLUTONIUM	...	<u>3.46E3 D/S/G 38=83% 39=17%</u>
149	9	23381 TLV TOTAL SR	...	<u>+- 6311.63+-809.643 D/SEC/ML</u>
150	10	23381 TLV TOTAL SR	...	<u>+- 359.661+-36.1358 D/SEC/ML</u>
151	12	23381 TLV TOTAL SR	...	<u>+- 173767+-14067.9 D/SEC/G</u>
152	13	23381 TLV TOTAL SR	...	<u>+- 21847.1+-1327.5 D/SEC/G</u>
153	12	8000 DRT WET DEN	...	INSUFICIENT SAMPLE

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Log #	Request Name	Log Type	Charge Num	Log Approval Info
I	L			
d Lab	Meth a Ana-			
x ID	# b lyst Analyte ARL			Result

261 #10	25920	PAG URANIUM	... < 1.5958E-04	G/L
262 11	3994	TLV ALPHA SCAN	...	TOO HOT FOR INSTRUMENT
263 11	33381	TLV TOTAL SR	... +- 63612.6+-3473.44	D/SEC/G
268 #12	25920	PAG URANIUM	... +- 1.90987E-03+-4.38871E-04	G/L
269 11	3941	TVP PLUTONIUM	... 2.93E3	D/S/G 38=92% 39=8%

840228-21	SFE-20		89496-224-009	Unapproved by
73 #1	3993	LEE GAMMA SCAN	...	ATTACHED
74 #2	3993	ILD GAMMA SCAN	...	ATTACHED
75 #3	3993	LEE GAMMA SCAN	...	ATTACHED
76 #4	3993	LEE GAMMA SCAN	...	ATTACHED
77 #5	3993	ILD GAMMA SCAN	...	ATTACHED
78 #1	3994	BRH ALPHA SCAN	...	0.019 A/S/G
79 #2	3994	BRH ALPHA SCAN	...	0.087 A/S/G

***** END *****

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Attachment 3
Tables 1 and 2 from WINCO-1021

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TABLE I
SFE-20 SAMPLE LOCATION AND MATERIAL

Identification Number	Location	Type of Sample
1	Pipes (exteriors) and walls (interior) in pump pit ~midway between CPP-642 and pit floor	Smear
2	Pipes and walls in pump pit 1-2 ft from bottom	Smear
3	Walls, floor, and ceiling of access tunnel	Smear
4	Representative areas of vault walls	Smear
5	SFE-20 tank (exterior)	Smear
7	Areas of apparent seepage on walls	Smear
8	Floor - south end of vault	Liquid
9	Floor - center section	Liquid
10	SFE-20 tank interior	Liquid
11	Floor - north end of vault	Dry solids
12	Bottom 6 in. - tank interior	Sediment
13	Bottom of pump pit	Wet-solids
14	Pump pit - sump	Liquid

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TABLE 2

RADIOISOTOPIC CONTENT OF SMEARS AND SAMPLES OF SFT-20 AREA
($\mu\text{Ci}/\text{smear}$ $\mu\text{Ci}/\text{g}$ for solids, $\mu\text{Ci}/\text{ml}$ for liquids, μ was reported in g/l)

Identification Number	Type	^{60}Co	^{113}Cs	^{138}Cs	^{138}Eu	^{152}Eu	^{143}Eu	^{149}Sm	^{152}Sm	μ	μ/L
1	Smear	-b	7.68×10^2	-b	-b	-b	-b	-b	-b	-c	-c
2	Smear	-b	8.97×10^3	-b	-b	-b	-b	-b	-b	-c	-c
3	Smear	55.4	1.39×10^4	59.2	594	570	121	-b	-b	-c	-c
4	Smear		8.19×10^3								
5	Smear	1.57	5.84×10^4	98.4	1200	770	204	-b	-b	-c	-c
7	Smear	95.1	4.16×10^4	-b	-b	-b	-b	-b	-b	-c	-c
8	Liquid	6.83	9.05×10^2	1.35	-b	-b	-b	-b	-b	-c	-c
9	Liquid	105	2.48×10^5	1.55	-b	-b	-b	-b	-b	-c	-c
20	Liquid	14.2	2.05×10^3	7.76	-b	-b	-b	-b	-b	-c	-c
Tank Interior											
11	dry Solids	2.15×10^4	8.92×10^4	1.06×10^4	1.5×10^5	1.31×10^5	4.73×10^4	-b	-b	3.72×10^6	7.92×10^4
12	wet Solids	3.22×10^6	5.54×10^7	1.62×10^6	1.38×10^5	1.21×10^5	-b	-b	-b	4.70×10^6	9.35×10^4
13	wet Solids	2.30×10^4	2.23×10^6	5.65×10^4	4.52×10^4	2.05×10^4	4.73×10^4	5.69×10^6	1.01×10^3	-c	-c
14	Liquid	-b	76	-b	-b	-b	-b	-b	-b	-c	-c

a. Table 1 lists location of each sample.

b. Isotope below detection limit.

c. Activity was not requested. Detection was based on criteria Alpha Scm. results.